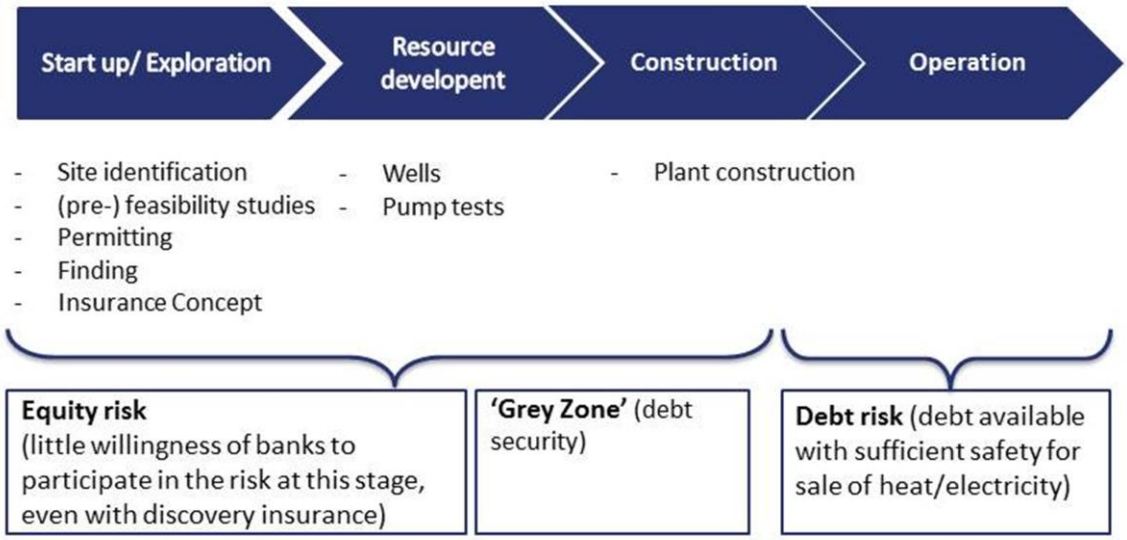
# Finance and Economics

## Advantages

Geothermal power can theoretically be developed anywhere in Europe. The main benefits of geothermal power plants are provision of baseload and flexible renewable energy, diversification of the energy mix, and protection against volatile and rising electricity prices. Using geothermal resources can provide economic development opportunities for countries in the form of taxes, royalties, technology export and jobs. The advancement of geothermal energy will require massive capital investment that cannot solely rely on public funds - private sector involvement is needed.

## Project Finance

Financing a geothermal project includes two crucial elements in the initial phase of the project development: a high capital investment and an insurance scheme to cover the geological risks, to be taken by equity.
A geothermal power project can be divided into different phases:




## Costs of an EGS project

The total costs of a geothermal project are dominated by capital costs at the beginning of the project. From experience, project planning can take up to approximately 10% of the overall capital costs.

Drilling costs represent 50% to 75% of the total costs.

EGS (Enhanced Geothermal System) engineering and the coverage of the risk with insurance are two other important expenses.

The annual operating costs are very low.

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|---|---|
| exploration: 1-3 Mio. € | wells: 10-30 Mio. € |
| power plant (4-5 MW): 15-20 Mio. € | EGS engineering: 4-8 Mio. € |
| insurances: 0,5-7 Mio. € | Project planning: ~ 10% |

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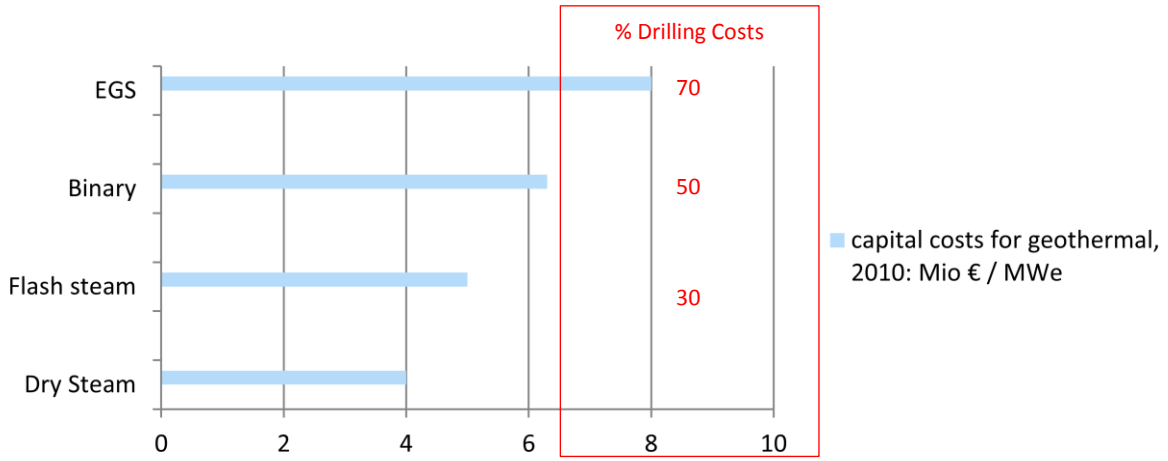
## Drilling Costs

Drilling represents from 30% to 50% of the cost of a hydrothermal geothermal electricity project and more than half of the total cost of Enhanced Geothermal Systems (EGS).




## Financial Incentives

- Support schemes are crucial tools of public policy for geothermal to compensate for market failures and to allow the technology to progress along its learning curve;
- Innovative financing mechanisms should be adapted to the specificities of geothermal technologies and according to the level of maturity of markets and technologies;
- A European Geothermal Risk Insurance Fund (EGRIF) is seen as an appealing public support measure for overcoming the geological risk;
- Whilst designing a support scheme, policy-makers should take a holistic approach which goes beyond the levelised cost of energy and includes system costs and all externalities. As an alternative, there is the chance to offer a bonus to geothermal for the benefits it provides to the overall electricity system: flexibility and base-load;

National governments have been using a wide range of public policy mechanisms to support the development of geothermal electricity. These can be categorised as either investment support (capital grants, tax exemptions or deductions on the purchase of goods) and operating support (price subsidies, renewable energy obligations with green certificates, tender schemes and tax reductions on the production of electricity). The most used support instrument for geothermal electricity in EU-Member states is the feed-in-system, which differs in the actual tariff provided, the number of years the tariff is paid and whether the scheme pertains to net / gross production.

## Risk Insurance

For now, the fairly small number of geothermal electricity operations in the EU does not provide a sufficient statistical basis to assess the probability of successful of the drilling. As a consequence, geothermal developers struggle to find insurance public or private schemes under affordable terms and conditions for the resource risk.